Optics and Spectroscopy (English translation of Optika i Spektroskopiya) 2014 vol.116 N6, pages 897-905

Multipole interactions in a LiTmF4 single crystal

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Abstract

We have considered magnetic and magnetoelastic characteristics of a van Vleck paramagnet LiTmF4 taking into account the interaction between thulium ions via the phonon field. We have calculated parameters of the multipole interaction that is caused by the interaction of Tm3+ ions with dynamic lattice deformations of the Bg symmetry. We have presented a self-consistent description of previously published results of measurements of temperature dependences of elastic constants and the nonlinear Zeeman effect in the optical spectrum of the LiTmF4 single crystal, as well as dependences of the magnetostriction on temperature, magnitude, and direction of the external magnetic field. © 2014 Pleiades Publishing, Ltd.

http://dx.doi.org/10.1134/S0030400X14060198